

# Processing Nonbinary Pronouns in L1 vs L2: An ERP Investigation

## Introduction

- Nonbinary Pronoun Constructions (NBPCs)** (e.g., singular *they*) are increasingly used for referring to **Nonbinary Individuals (NBIs)**.
- Some people report **difficulty in comprehension**, often citing perceived (un)grammaticality → fuels political, social, linguistic, and psychological discourse + activism.<sup>1</sup>
- Previous studies on **online processing** report **P600 effects** for singular *they*, but do not establish it as an NBPC specific to an NBI.<sup>2,3</sup>
- L2 English research:** Some singular *they* studies show **increased processing costs**,<sup>4,5</sup> but no comparable L2 studies exist for other languages.
- Explicit pronoun introduction**<sup>6</sup> and **increased exposure**<sup>7</sup> promotes correct interpretation.

## Method



Jennifer	George	Alex	Plural
Jennifer works then <b>she/he*</b> plays.	George works then <b>he/she*</b> plays.	Alex works then <b>they/he*/she*</b> play.	[ ] and [ ] work then <b>they/he*/she*</b> play.
Jennifer travaille puis <b>elle/il*</b> joue.	George travaille puis <b>il/elle*</b> joue.	Alex travaille puis <b>iel/il*/elle*</b> joue.	[ ] et [ ] travaillent puis <b>iel/il*/elle*</b> jouent.

- N = 39 Right-handed L1 English participants
- 3 Sessions across 5 days (48 hrs between each)
- Trained<sup>8</sup> on subset of French grammar and vocabulary with inclusion of French neopronoun *iel*<sup>9</sup>, S1 and S2
- Completed Acceptability Judgement Task (AJT) w/ EEG recording, S2 and S3
- 2048 Hz, Quik-Cap 32 Ag/AgCl, <10 kΩ
- Individual Differences: Transgender IAT, WMU, Social & Economic Conservatism Scale
- Cis (Jennifer + George), NB, Plural (Combination)
- Analysis performed using General Additive Mixed Models, fit per time window (TW) of interest

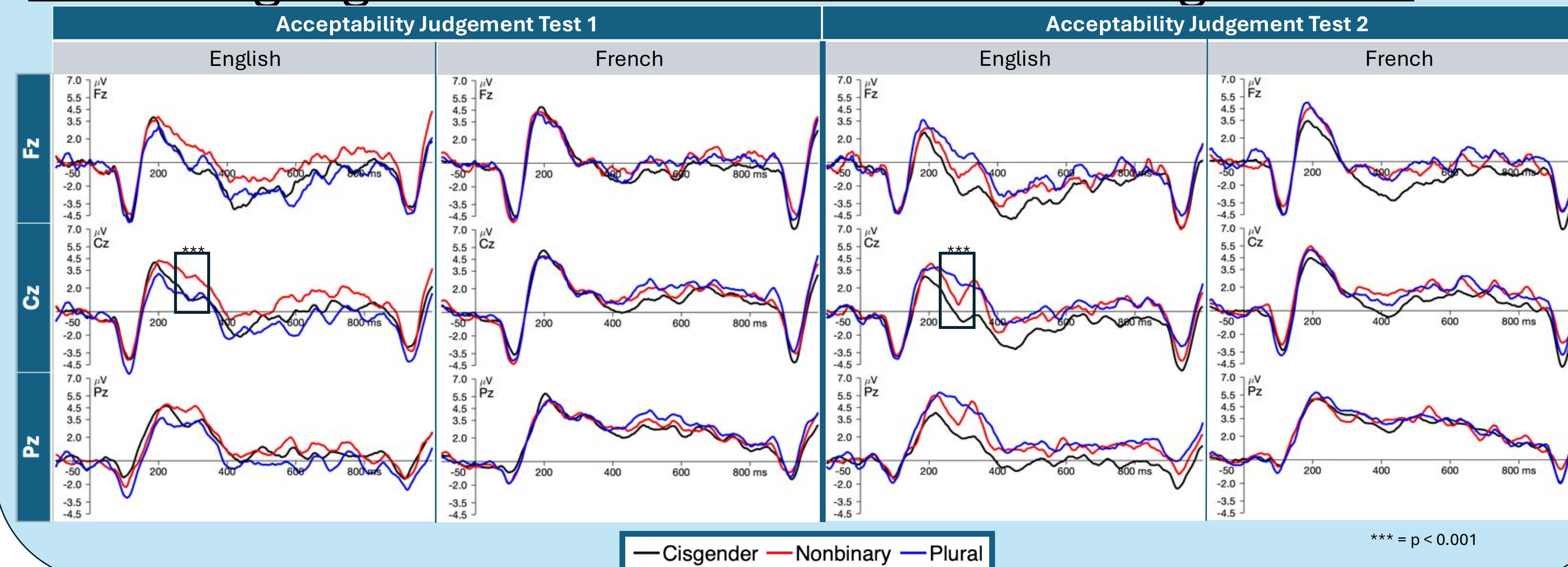
TWamp ~ Language\*Construction\*Acceptability\*AJT + s(subject, bs = "re") + s(item, bs = "re")

## Acknowledgements

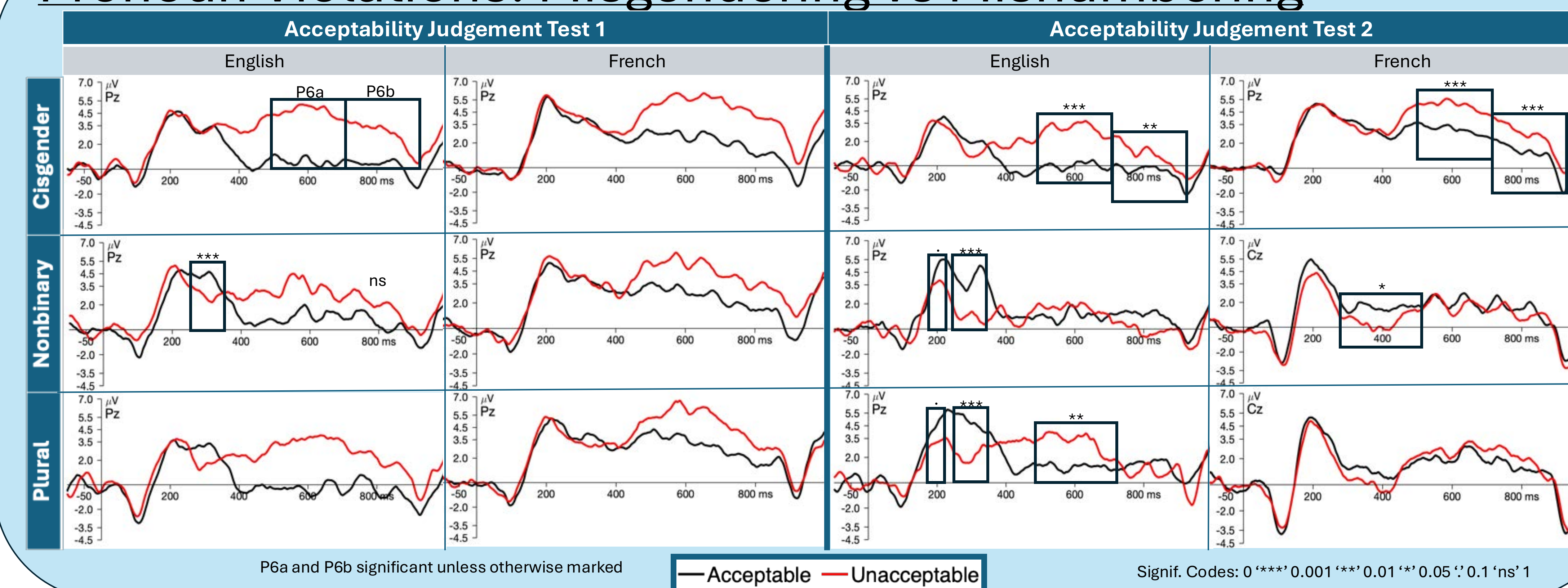
Thank you to the David C. Frederick Honors College for providing funding for this work and conference.  
Thank you to the Learning Research and Development Center for providing a space for research.  
Thank you to my thesis committee for guiding this research process.

## Results

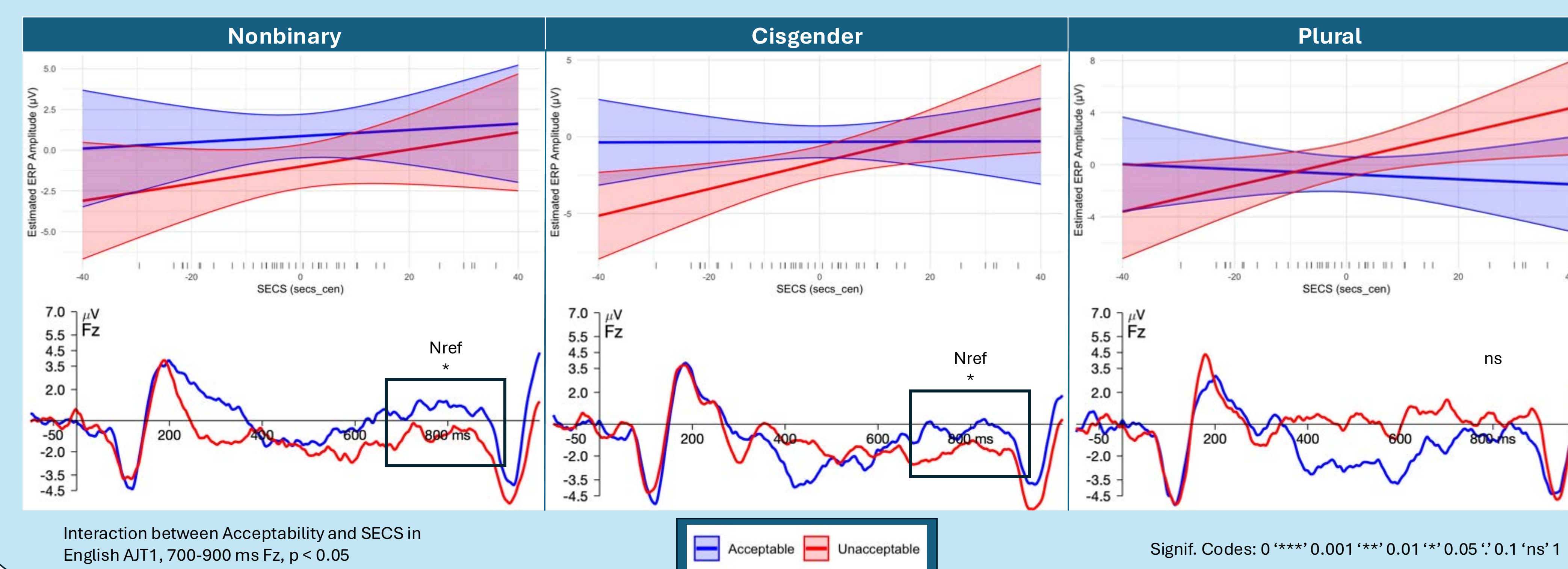
### Disentangling Biosocial Gender and Number Agreement



### Pronoun Violations: Misgendering vs Misnumbering



### Referential Failure Driven by Individual Differences



## Discussion

### Comparing the Conditions

- Standard pronouns (cis & sometimes plural) show a **400 ms TW negativity** compared to NBPCs → Possible **Task Effect?**
- Fronto-Central** distribution may contribute to perceived **positive deflections**.
- First significant in **English AJT1**, visually suggested in **French AJT1**, but both emerge in **AJT2**.
- Previously reported **P600 effects for NBPCs** not strongly supported.
- P6a/b regions** show complexity due to TE.
- NBPCs may require greater cognitive load**, shown by **300 ms TW positivity**.
- IDV:** Higher **WMUC** predicts **higher 300 ms TW amplitude** → linked to **antecedent retrieval**.

### Pronoun Violations

- Misgendering cis characters** consistently elicits **P600** across languages/tests.
- Misgendering NB characters:**
- English:** P6a in AJT1, evolves into P300 + marginal P200 in AJT2.
- French:** P600 shifts to N400, reflecting **semantic (not syntactic) processing** of biosocial gender.
- IDV:** Lower **SECS** scores → **N400 effects in AJT1** instead of P600.
- Number Violations:**
- P600 effects consistent **except in French AJT2** → Possible L2 learning of biosocial gender-based agreement rules?

### Referential Failure

- Nref effects** suggest referential processing failure, indicating **sensitivity to misgendering** (NB & cis) in **English AJT1**.
- IDV analysis:** Sensitivity **decreases with higher** (more conservative) **SECS scores**.

## References

- Saguy, A. C.; Williams, J. A. A Little Word That Means A Lot: A Reassessment of Singular They in a New Era of Gender Politics. *Gender & Society* **2022**, 36 (1), 5-31. DOI: 10.1177/08912432211057921.
- Prasad, G.; Morris, J. The P600 for singular "they": How the brain reacts when John decides to treat themselves to sushi. **2020**. DOI: <https://doi.org/10.31234/osf.io/hwzke>.
- Leventhal, O.; Camilliere, S.; Chen, P.; Grodner, D. Using ERPs to investigate the processing of singular they. In CUNY conference on Human Sentence Processing, Amherst, MA (virtual); 2020.
- Ma, Z.; Wu, S.; Xu, S. Acceptance and Online Interpretation of "Gender-Neutral Pronouns": Performance Asymmetry by Chinese English as a Foreign Language Learners. *Frontiers in psychology* **2022**, 12, 765777-765777. DOI: 10.3389/fpsyg.2021.765777.
- Stormbom, C. Singular they in English as a foreign language. *Applied linguistics review* **2022**, 13 (5), 873-897. DOI: 10.1515/applrev-2019-0115.
- Arnold, J. E.; Mayo, H. C.; Dong, L. My pronouns are they/them: Talking about pronouns changes how pronouns are understood. *Psychonomic bulletin & review* **2021**, 28 (5), 1688-1697. DOI: 10.3758/s13423-021-01905-0.
- Ye, E.; Arnold, J. E. People adapt to Nonbinary Singular *They* through exposure. [Poster] 38th Annual Conference on Human Sentence Processing, University of Maryland: College Park; 2025.
- Tolentino, L. C.; Tokowicz, N. Cross-Language Similarity Modulates Effectiveness of Second Language Grammar Instruction. *Language learning* **2014**, 64 (2), 279-309. DOI: 10.1111/lang.12048.
- Knisely, K. A. Le français non-binaire: Linguistic forms used by non-binary speakers of French. *Foreign language annals* **2020**, 53 (4), 850-876. DOI: 10.1111/flan.12500.